

- proxy
 -
 -
- base
 -
 -
 - — authorize
 -
 - — authenticate
 -
 - — post_auth
 - — accounting
 - : Start, Stop, Interim-Update
 -
 - Accounting-On Accounting-Off
 -
 -
 - «»
 - Accounting-On Accounting-Off
 -
 -



. plugins <plugin_name> <plugin_instance_name>, <plugin_name> — , <plugin_instance_name> — .

proxy

. Perl- hard.pm FreeRADIUS proxy, .

plugins proxy <plugin_instance_name> routes

:-

- — , ;
- — , .

, . , , plugins proxy <plugin_instance_name> default .

```
plugins:
  proxy:
    dhcp:
      routes:
        base/dhcp-o82: $request.RAD_REQUEST.try("DHCP-Relay-Circuit-Id").present?()
        base/dhcp-ip-private: $request.RAD_REQUEST.DHCP-Client-IP-Address.private_ip4?()

    default: "base/dhcp-ip-public"
```

HARD base, . FreeRADIUS DHCP-. proxy/dhcp HARD. proxy/base :

1. DHCP-Relay-Circuit-Id, dhcp-o82 base. FreeRADIUS.
2. DHCP-Client-IP-Address(DHCP-Relay-Circuit-Id) IP-, dhcp-o82 base. FreeRADIUS.

base

, FreeRADIUS.

plugins base <plugin_instance_name> call_stack

- :
1. (), after-
 2. :, .
 3. (), before-

— IPoE- IP- Cisco ISG

```
plugins:
  base:
    isg-ipoe-by-ip:
      call_stack:
        #
        - set_tag_before/request_type

        #
        - reject_on_error/main

        #
        - check_attr_before/finish_processing_of_unnecessary_accounting

        #
        - set_tag_before/base-session-accounting

        # ISG- IPOE-SC-INET-<Rate>-<Burst>
        - set_tag_before/auth-internet-access-isg-service
        - match_before/get_speed_limit_values_for_internet-access-isg-service
        - format_after/set_cisco-service-info_attr_for_internet-access-isg-service

        #
        - map_after/add_prefix_to_isg-services
```

```
plugins base <plugin_instance_name> actions
, . 4 FreeRADIUS:

1. .
2. .
3. -.
4. .

, FreeRADIUS : http://wiki.freeradius.org/guide/Concepts.
```

— authorize

```
RADIUS- HARD:

1. , , .
2. RADIUS- .

:

1. .
2. .
```

```
plugins base <plugin_instance_name> actions authorize customer_profile plugins base <plugin_instance_name> actio
ns authorize provider_profile . $customer_profile $provider_profile, — $bind_id.

:
```

| | | |
|------------|--------------|---|
| | | |
| set_ by | search_cache | (MongoDB). , query. () . , , . — IPoE-, . , \$bind_id() , plugins base <plugin_instance_name> actions authorize de fault_bind_type. |

| | | |
|--------|---------------------------------|---|
| | set_first_from_customer_profile | . filter , . |
| | set_first_from_provider_profile | . filter , . , , , : DHCP Option 82, Q-in-Q VLAN .. MAC- , , . |
| query | key:value | . search_cache set_by. key:value . , , . , . key : (, MAC-), (, IP-). value . , : \$in. , , IP- , . map_before IP- . |
| filter | key:value | . set_first_from_customer_profile set_first_from_provider_profile set_by. , .. |

— IPoE- VLAN' MAC-

```
plugins:
  base:
    jmx5-qinq:
      actions:
        authorize:
          customer_profile: &customer_profile
          set_by: search_cache
          query:
            MAC-Address: $request.RAD_REQUEST.User-Name.normalize_mac()

          provider_profile: &provider_profile
          set_by: search_cache
          query:
            Switch-VLAN: $var.Remote-Circuit-Ids.Remote_Id
            Switch-Port-Code: $var.Remote-Circuit-Ids.Circuit_Id

        default_bind_type: network_connection
```

— DHCP Option 82

```
plugins:
  base:
    se-ipoe-by-o82:
      actions:
        authorize:
          provider_profile:
            set_by: search_cache
            query:
              Switch-IP: $request.RAD_REQUEST.Agent-Remote-Id.substring(6).unhex()
              Switch-Port-Code: $request.RAD_REQUEST.Agent-Circuit-Id.substring(12).to_i(16)

          customer_profile:
            set_by: set_first_from_provider_profile
            filter:
              Auth-Scheme: ' "DHCP+L2TP" '
```

```

plugins:
  base:
    l2tp-by-login:
      actions:
        authorize:
          customer_profile: &customer_profile
          set_by: search_cache
          query:
            L2TP-Login: $request.RAD_REQUEST.User-Name.lower().regexp_replace("@.*$|\\\\\\t|\\s")
            Auth-Scheme: "DHCP+L2TP"

          provider_profile: {}

```

- ```

, . :

```
- \$request.
  - \$customer\_profile.
  - \$provider\_profile.
  - \$bind\_id.
  - before- \$var \$context.

```


, .
plugins base <plugin_instance_name> actions authorize reply . :

```

| condition          |                | : , , .                                                                                                                                                                                                                              |
|--------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| template RAD_CHECK | key:value<br>. | RAD_CHECK , key — RADIUS-, value — , . value , . , . RAD_CHECK FreeRADIUS<br>: <ul style="list-style-type: none"> <li>• Cleartext-Password .</li> <li>• Pool-Name IP-.</li> <li>• Auth-Type <b>Reject</b> <b>Accept</b> .</li> </ul> |
| template RAD_REPLY | key:value<br>. | RAD_REPLY , key — RADIUS-, value — , . value , . , , ,Cisco-AVPair.                                                                                                                                                                  |
| template result    | <b>\$rlm</b>   | . <b>FreeRADIUS.</b> : <ul style="list-style-type: none"> <li>• \$rlm.OK — .</li> <li>• \$rlm.REJECT — .</li> </ul>                                                                                                                  |

( ) : , , — .

 , , , **render\_reply\_after.** , , . after- .

 RAD\_CHECK RAD\_REPLY '\*\*\*. , « RADIUS- — ». , . , **except.**

```

plugins:
 base:
 isg-ipoe-by-ip:
 actions:
 authorize:
 reply: &default_reply
 # ISG- IPOE-SC-INET-<Rate>-<Burst>
 - condition: $context.has_tag?("auth-internet-access-isg-service") and $request.RAD_REQUEST.User-
Name.like?("^IPOE-SC-INET(-\d+){2}$")
 template:
 RAD_CHECK: &default_rad_check
 # RAD_CHECK , «»
 '*': $request.RAD_CHECK.except("Cleartext-Password")
 # IP-, .
 # FreeRADIUS «» .
 Cleartext-Password: $request.RAD_REQUEST.User-Password

 RAD_REPLY:
 Cisco-AVPair:
 - "subscriber:accounting-list=HYDRA-IPOE"
 - "ip:traffic-class=in access-group name IPOE-ACL-ALL-TRAFF priority 1000"
 - "ip:traffic-class=out access-group name IPOE-ACL-ALL-TRAFF priority 1000"
 Acct-Interim-Interval: "300"

 result: $rlm.OK

-
 - condition: $customer_profile.null?()
 template:
 RAD_CHECK:
 Auth-Type: "Reject"

 RAD_REPLY:
 Reply-Message: "Incorrect IP address"

 result: $rlm.NOTFOUND

#
 - condition: $customer_profile.attributes.try("Internet-Access-Service-State") ==
"SERV_STATE_Provision"
 template:
 RAD_CHECK:
 <<: *default_rad_check

 RAD_REPLY: &ok_rad_reply
 Cisco-AVPair: "subscriber:accounting-list=HYDRA-IPOE"
 Acct-Interim-Interval: "300"
 Idle-Timeout: "86400"
 Cisco-Account-Info: $customer_profile.attributes.ISG-IPoE-Services.split(",")

 result: $rlm.OK

#
 - template:
 RAD_CHECK:
 <<: *default_rad_check

 RAD_REPLY:
 <<: *ok_rad_reply
 Cisco-Account-Info:
 - "IPOE-SC-REDIRECT"
 - "IPOE-SC-OPENGARDEN"

 result: $rlm.OK

```

— authenticate

```
RADIUS- HARD , pap, eap, mschap .. :
1. .
2. .
3. .

authorize. , authorize — , YAML- .

:
1. Simultaneous-Use . , .
2. . , , :.
3. , simultaneous-limit-exceeded.

, after-. , , «», .
```

```

plugins:
 base:
 l2tp-by-login:
 actions:
 authorize:
...
 authenticate:
 customer_profile:
 # authorize
 <<: *customer_profile

 provider_profile: {}

 reply:
 #
 - condition: $context.has_tag?('simultaneous-limit-exceeded')
 template:
 RAD_REPLY:
 Reply-Message: '"You are already logged in"'

 result: $rlm.REJECT

 # IP-
 - condition: ' $customer_profile.attributes.try("Internet-Access-Service-Status") ==
"SERV_STATE_Provision"
 and $customer_profile.attributes.Real-IP-Address.ip4?()'
 template:
 RAD_REPLY:
 Acct-Interim-Interval: '"300"'
 Cisco-AVPair:
 - '"ip:vrf-id=REAL"'
 - '"ip:ip-unnumbered=loopback221"'
 Class: $customer_profile.attributes.L2TP-Class.coalesce("7")
 Framed-IP-Address: $customer_profile.attributes.Real-IP-Address
 Idle-Timeout: '"86400"'

 result: $rlm.OK

 # IP-
 - condition: $customer_profile.attributes.try("Internet-Access-Service-Status") ==
"SERV_STATE_Provision"
 template:
 RAD_REPLY:
 Acct-Interim-Interval: '"300"'
 Cisco-AVPair:
 - '"ip:vrf-id=NAT"'
 - '"ip:ip-unnumbered=loopback220"'
 Class: $customer_profile.attributes.L2TP-Class.coalesce("5")
 Framed-Pool: '"NAT-1"'
 Idle-Timeout: '"86400"'

 result: $rlm.OK

 # ()
 - template:
 RAD_REPLY:
 Acct-Interim-Interval: '"600"'
 Cisco-AVPair:
 - '"ip:vrf-id=NOPAY"'
 - '"ip:ip-unnumbered=loopback222"'
 Cisco-Service-Info: '"QU;256000;9600;9600;D;256000;9600;9600"'
 Framed-Pool: '"FREE-DNAT"'
 Idle-Timeout: '"86400"'
 mpd-limit:
 - '"out#100=all shape 256000 pass"'
 - '"in#100=all shape 256000 pass"'
 Session-Timeout: '"86400"'

 result: $rlm.OK

```

## -- post\_auth

```
FreeRADIUS HARD, , DHCP-c. FreeRADIUS.
 , IP-, FreeRADIUS. IP- RADIUS-, -. , IP-, , .
```

```
, authorize:
```

1. .
2. .

```
authorize.
```

## -- FreeRADIUS DHCP- 82

```
plugins:
 base:
 dhcp-by-o82:
 actions:
 post_auth:
 provider_profile:
 set_by: search_cache
 query:
 Switch-IP: $request.RAD_REQUEST.DHCP-Relay-Remote-Id.substring(6).unhex()
 Switch-Port-Code: $request.RAD_REQUEST.DHCP-Relay-Circuit-Id.substring(12).to_i(16)

 customer_profile:
 set_by: set_first_from_provider_profile
 filter:
 Auth-Scheme: "DHCP+L2TP"

 reply:
 #
 - condition: ' $customer_profile.present?()
 and $customer_profile.attributes.DHCP-IP-Address.ip4?()
 and $customer_profile.attributes.DHCP-Gateway-IP.ip4?()
 and $customer_profile.attributes.DHCP-Subnet-Mask.ip4_mask?()'

 template:
 RAD_REPLY:
 DHCP-Domain-Name-Server:
 - "192.168.11.15"
 - "192.168.11.16"

 DHCP-IP-Address-Lease-Time: "86400"
 DHCP-Router-Address: $customer_profile.attributes.DHCP-Gateway-IP
 DHCP-Subnet-Mask: $customer_profile.attributes.DHCP-Subnet-Mask
 DHCP-Your-IP-Address: $customer_profile.attributes.DHCP-IP-Address

 result: $rlm.OK

 #
 - condition: $customer_profile.null?()
 template:
 RAD_REPLY: {}
 reject_reason: "Customer equipment profile not found // Option 82"
 result: $rlm.REJECT

 # // -
 - template:
 RAD_REPLY: {}
 reject_reason: "Not valid customer equipment profile // Option 82"
 result: $rlm.REJECT
```

## -- accounting

```
.

Event-Timestamp , Acct-Delay-Time. plugins base <plugin_instance_name> actions accounting event_timestamp fo
rmat en_US.UTF-8. datetime.strptime Python.
```



: Start, Stop, Interim-Update


: MD5- (Acct-Session-Id) , plugins base <plugin\_instance\_name> actions accounting session unique\_id\_attributes.

sessions . , , — .



t1 - . t1 (t1-... accounting session lookup hours)() ( , ), t1 (t1-... accounting session lookup timed\_out\_days)() . -, batch , - ( - ). batch , , , . ... accounting session lookup additional\_hours ( ) .

, customer\_profile provider\_profile plugins base <plugin\_instance\_name> actions accounting. . auth orize. , , authorize— , YAML- .

 new-session. , , , . , .

. plugins base <plugin\_instance\_name> actions accounting session templates . :

| condition                      |                                                                                               | : , , .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| attributes                     | key:<br>value                                                                                 | , . key— , value— , . value , .<br>, , Stop- Acct-Terminate-Cause, .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| template                       | key:<br>value.                                                                                | , key— RADIUS-, value— , . value , . , , ,Cisco-AVPair.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| services                       | : <ul style="list-style-type: none"><li>• service_id</li><li>• value</li><li>• unit</li></ul> | , : <ul style="list-style-type: none"><li>• service_id— .</li><li>• value— , .</li><li>• unit— . :bytes, kilobytes, megabytes, gigabytes, seconds, minutes, hours, days, months, bits_per_second, kilobits_per_second, megabits_per_second.</li></ul><br>, : . Acct-Input-Octets, Acct-Output-Octets, Acct-Input-Gigawords Acct-Output-Gigawords, , : <ul style="list-style-type: none"><li>• \$request.RAD_REQUEST.Acct-Input-Octets.to_i() + 4 * \$request.RAD_REQUEST.Acct-Input-Gigawords.to_i().gigabytes()</li><li>• \$request.RAD_REQUEST.Acct-Output-Octets.to_i() + 4 * \$request.RAD_REQUEST.Acct-Output-Gigawords.to_i().gigabytes()</li></ul> |
| service_profile<br>template_id |                                                                                               | , . , . .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| load_to_hydra                  | true, false                                                                                   | , . — «», .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

() : , , — .

, \$session. , , , .

## accounting — L2TP- -

```
plugins:
 base:
 l2tp-by-login:
 actions:
 authorize:
...
 authenticate:
...
 accounting:
 #
 customer_profile:
 <<: *customer_profile

 #
 provider_profile: {}

 session:
 #
 unique_id_attributes: [User-Name, NAS-IP-Address, Framed-IP-Address, NAS-Port]

 #
 templates:
 #

 - condition: ' $customer_profile.attributes.try("Service-State-Code") == "SERV_STATE_Provision"
 or $session.attributes.try("Service-State-Code") == "SERV_STATE_Provision"'

 attributes: &session_attributes
 Calling-Station-Id: $request.RAD_REQUEST.try("Calling-Station-Id")
 Called-Station-Id: $request.RAD_REQUEST.try("Called-Station-Id")
 Framed-IP-Address: $request.RAD_REQUEST.try("Framed-IP-Address")
 NAS-Identifier: $request.RAD_REQUEST.NAS-Identifier
 NAS-IP-Address: $request.RAD_REQUEST.NAS-IP-Address
 Service-State-Code: $customer_profile.attributes.try("Service-State-Code")
 Session-Template: '"Full access session"'
 User-Name: $request.RAD_REQUEST.User-Name

 #
 # -
 services:
 # «- .»
 - service_id: 40213701
 value: $request.RAD_REQUEST.try("Acct-Output-Octets", "0").to_i() + 4 * $request.
RAD_REQUEST.try("Acct-Output-Gigawords", "0").to_i().gigabytes()
 unit: bytes

 # «- .»
 - service_id: 40213501
 value: $request.RAD_REQUEST.try("Acct-Input-Octets", "0").to_i() + 4 * $request.RAD_REQUEST.
try("Acct-Input-Gigawords", "0").to_i().gigabytes()
 unit: bytes

 # -
 - condition: ' $customer_profile.null?()
 and $session.customer_profile_id.empty?()'
 attributes:
 <<: *session_attributes
 Session-Template: '"Guest session"'
 load_to_hydra: false

 # -
 - attributes:
 <<: *session_attributes
 Session-Template: '"Restricted session"'

 services: {}
```

```

plugins:
 base:
 isg-ipoe-by-ip:
 actions:
 authorize:
...
 authenticate:
...
 accounting:
 # , : IP-
 customer_profile:
 <<: *customer_profile

 #
 provider_profile: {}

 session:
 templates:
 #
 - condition: $request.RAD_REQUEST.try("Cisco-Service-Info").empty?()

 attributes: &session_attributes
 User-Name: $request.RAD_REQUEST.User-Name
 NAS-IP-Address: $request.RAD_REQUEST.NAS-IP-Address
 NAS-Port-Id: $request.RAD_REQUEST.NAS-Port-Id
 Cisco-AVPair: $request.RAD_REQUEST.Cisco-AVPair
 Cisco-Service-Info: $request.RAD_REQUEST.try("Cisco-Service-Info")

 #
 - condition: $request.RAD_REQUEST.Cisco-Service-Info.like?("^NIPOE-SC-(INET|NIGHT)-.+$")
 attributes:
 # ,
 <<: *session_attributes

 services:
 # «- .»
 - service_id: 40213501
 value: $request.RAD_REQUEST.try("Acct-Input-Octets", "0").to_i() + 4 * $request.RAD_REQUEST.
try("Acct-Input-Gigawords", "0").to_i().gigabytes()
 unit: bytes

 # «- .»
 - service_id: 40213701
 value: $request.RAD_REQUEST.try("Acct-Output-Octets", "0").to_i() + 4 * $request.
RAD_REQUEST.try("Acct-Output-Gigawords", "0").to_i().gigabytes()
 unit: bytes

 service_profile:
 # «IPoE - »
 template_id: 25244901

 #
 - condition: $request.RAD_REQUEST.Cisco-Service-Info.like?("^NIPOE-SC-(LOCAL|PRIVATE)$")
 attributes:
 # ,
 <<: *session_attributes

 services:
 # «- .»
 - service_id: 40214001
 value: $request.RAD_REQUEST.try("Acct-Input-Octets", "0").to_i() + 4 * $request.RAD_REQUEST.
try("Acct-Input-Gigawords", "0").to_i().gigabytes()
 unit: bytes

 # «- .»
 - service_id: 40214201
 value: $request.RAD_REQUEST.try("Acct-Output-Octets", "0").to_i() + 4 * $request.

```

```

RAD_REQUEST.try("Acct-Output-Gigawords", "0").to_i().gigabytes()
 unit: bytes

 service_profile:
 # «IPoE - »
 template_id: 25245101

,
- attributes:
 # ,
 <=: *session_attributes


 service_profile:
 # «IPoE - »
 template_id: 25245101

```

## Accounting-On Accounting-Off

, **Acct-Status-Type** Accounting-On Accounting-Off, . RADIUS- .

on/off- plugins base <plugin\_instance\_name> actions accounting on\_off\_attributes key:value, key — , value — .

 on/off- , on\_off\_attributes plugins base <plugin\_instance\_name> actions accounting session templates at tributes.

, . accounting , .

| on/off- — | NAS-IP-Address | on/off- |
|-----------|----------------|---------|
|-----------|----------------|---------|

```

plugins:
 base:
 ran-by-login:
 actions:
 authorize:
...
 authenticate:
...
 accounting:
 session:
 templates:
 - attributes:
 NAS-IP-Address: $request.RAD_REQUEST.NAS-IP-Address
 User-Name: $request.RAD_REQUEST.User-Name

 on_off_attributes:
 NAS-IP-Address: $request.RAD_REQUEST.NAS-IP-Address

```

plugins base <plugin\_instance\_name> actions <action\_name> hooks , .

<hook\_type>/<hook\_instance\_name>, <hook\_type> — , <hook\_instance\_name> — .

 :.

HARD batch , , ,3:

/etc/cron.d/hard

```
HARD RADIUS accounting loader
*/3 * * * * hard /opt/hydra/hard/init/hard.sh -f /etc/hydra/hard batch &>/dev/null
```



sessions — , . . , , . service\_profile template\_id , .

EP\_SESSIONS . , , EX\_DATA\_COLLECT, « RADIUS- ».

load\_seances . , HARD , .

« »

, plugins base <plugin\_instance\_name> actions accounting session lookup hours , , . , , .



RADIUS- RADIUS- :

- , RADIUS- Accounting-On Accounting-Off. — .
- . 1.5-2.5 ([Acct-Interim-Interval](#)), . , .
- , - RADIUS- , , RADIUS- RADIUS-.

Accounting-On Accounting-Off

accounting . , :

- , .
- on/off-.
- on/off-, , , .

, plugins base <plugin\_instance\_name> actions accounting session lookup timed\_out\_days, . , , .

, :

- .
- , .
- Accounting-On Accounting-Off.
- .